Kramer Electronics, Ltd.

USER MANUAL

Model:

FC-41

HD-SDI To Component Converter

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer **FC-41** *HD-SDI To Component Converter*, which is ideal for broadcast and production video studios, postproduction and duplication studios, and non-linear editing.

The package includes the following items:

- **FC-41** *HD-SDI To Component Converter*
- Power supply
- Null-modem adapter
- This user manual[2]

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables[3]

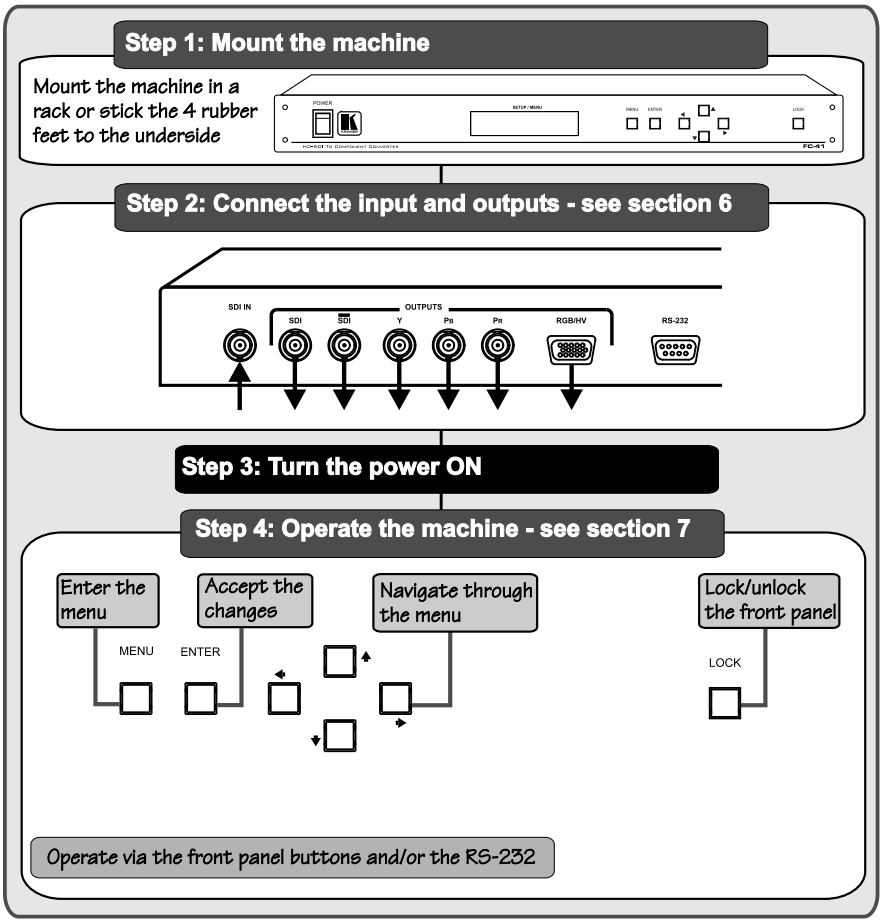
1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

2 Download up-to-date Kramer user manuals from the Internet at this URL: http://www.kramerelectronics.com

3 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.



3 Overview

The Kramer **FC-41** is a high performance converter for HD-SDI. It converts an HD-SDI input signal to component (Y, PB, PR) and RGB/HV signals.

In addition, the **FC-41** features:

- Component and SDI outputs on BNC connectors, and an RGBHV output on a 15-pin HD computer graphics video connector
- An SDI input which is reclocked and equalized, and distributed to two HD-SDI outputs
- Output resolution which is the same as that of the input and is compatible with 720p and 1080i up to 60Hz, as well as 1080p up to 30Hz
- ProcAmp controls, with memory for saving and loading 16 setups
- A component output with tri-level syncs
- A highly accurate color bar generator with eight built-in test patterns
- A lockable front panel to prevent unintentional tampering with the unit

The **FC-41** converter can be controlled via its front panel with a user-friendly LCD, and also has an RS-232 interface. It is housed in a 19" 1U rack mountable enclosure, and is fed from a 100-240 VAC universal switching power supply.

3.1 Recommendations for Achieving the Best Performance

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer **FC-41** away from moisture, excessive sunlight and dust

4 Your FC-41 HD-SDI To Component Converter

Figure 1 and Table 1 define the **FC-41**:

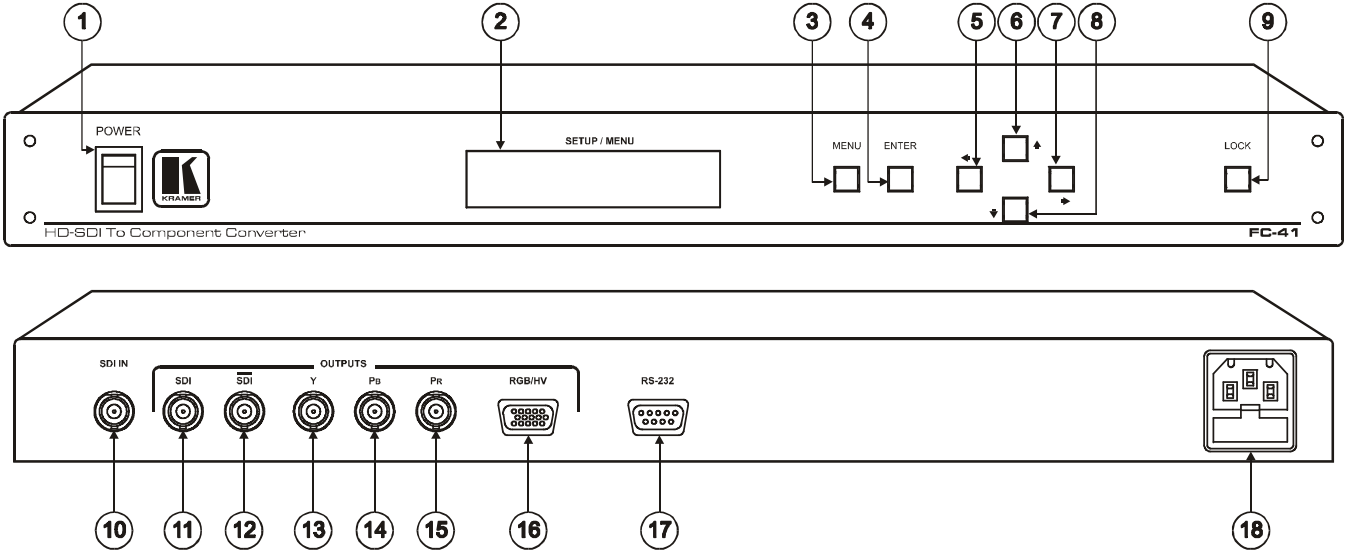


Figure 1: FC-41 HD-SDI To Component Converter

Table 1: FC-41 HD-SDI To Component Converter Features

#	Feature		Function
1	*POWER* Switch		Illuminated switch for turning the unit ON or OFF
2	*SETUP / MENU* LCD Display		Displays the setup and the menu
3	*MENU* Button		Press to open the menu (see section 7.1)
4	*ENTER* Button		Press to load and save a set up, and to accept changes
5	⬅ Button		Press to decrease numerical values or select from several definitions
6	⬆ Button		Press to move up the menu list values
7	➡ Button		Press to increase numerical values or select from several definitions
8	⬇ Button		Press to move down the menu list
9	*LOCK* Button		Press and hold[1] to lock/unlock the front panel buttons
10	*SDI IN* BNC Connector		Connects to the HD/SD SDI source
11	*OUTPUTS*	*SDI* BNC Connector	Connects to the HD-SDI acceptor[2]
12	*OUTPUTS*	*SDI* BNC Connector	Connects to the HD-SDI acceptor[2]
13	*OUTPUTS*	*Y* BNC Connector	Connects to the component video acceptor
14	*OUTPUTS*	*PB* BNC Connector	
15	*OUTPUTS*	*PR* BNC Connector	
16	*OUTPUTS*	*RGB/HV* 15-pin HD Connector	Connects to the RGB or RGBHV acceptor
17	*RS-232* 9-pin D-sub Port		Connect to the PC or the remote controller
18	Power Connector with Fuse		AC connector, enabling power supply to the unit

1 For about 3 seconds

2 The output is reclocked and equalized

5 Installing the FC-41 in a Rack

This section describes what to do before installing in a rack and how to rack mount.

Before Installing in a Rack

Before installing in a rack, be sure that the environment is within the recommended range:	
Operating temperature range	+5º to +45º C (41º to 113º F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20º to +70º C (-4º to 158º F)
Storage humidity range	5 to 95% RHL, non-condensing

CAUTION!!

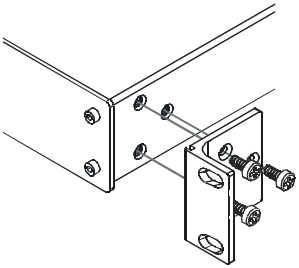
When installing in a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note that:

- **In some models, the front panel may feature built-in rack ears**
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions (you can download it at: http://www.kramerelectronics.com)

6 Connecting the FC-41 HD-SDI To Component Converter

To connect the **FC-41**, as illustrated in the example in Figure 2, do the following[1]:

1. Connect the SDI source (for example, an HD-SDI Video player) to the SDI IN BNC connector.
2. Connect the OUTPUTS:
   - Connect the SDI BNC connector to an HD-SDI acceptor (for example, a non linear editor)
   - Connect the SDI BNC connector to an HD-SDI acceptor (for example, an HD-SDI display)
   - Connect the Y, PB, PR BNC connectors to a component video acceptor (for example, a plasma display)
   - Connect the RGB/HV 15-pin HD computer graphics video connector to an RGBHV acceptor (for example, a projector)
3. Connect a PC or other controller, if required (see section 6.1).
4. Connect the power cord[2] (not shown in Figure 2).

1 Switch OFF the power on each device before connecting it to your FC-41. After connecting your FC-41, switch on its power and then switch on the power on each device.

2 We recommend that you use only the power cord that is supplied with this machine

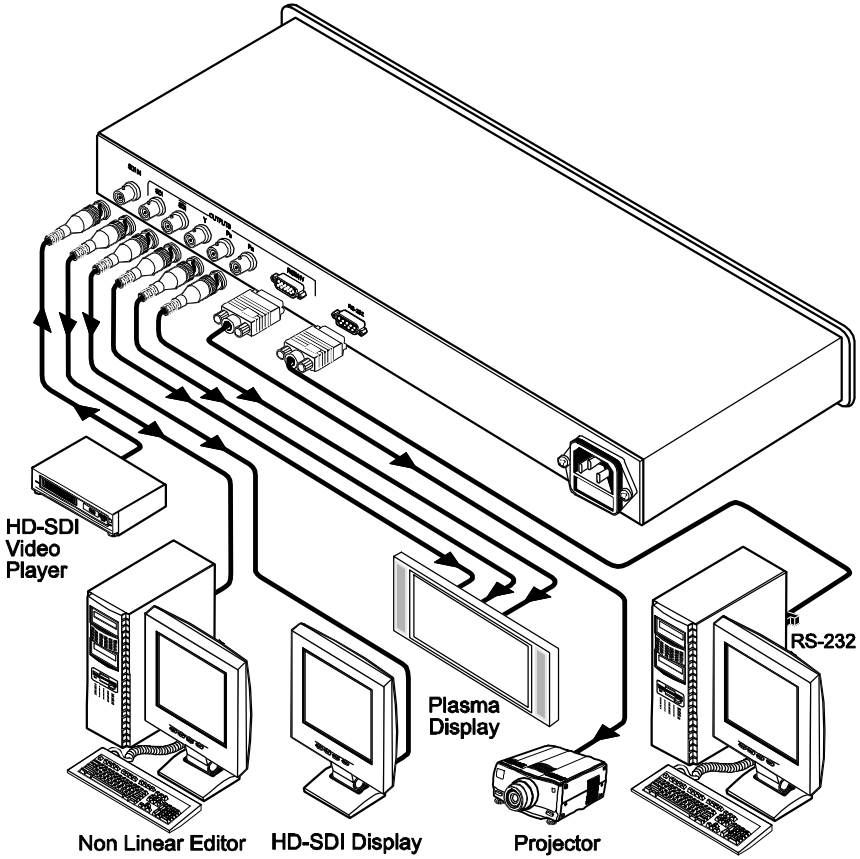


Figure 2: Connecting the FC-41 HD-SDI To Component Converter

6.1 Connecting a PC

To connect a PC to the **FC-41**, using the Null-modem adapter provided with the machine (recommended):

- Connect the RS-232 9-pin D-sub rear panel port on the **FC-41**unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 9-pin D-sub port on your PC

To connect a PC to the **FC-41**, without using a Null-modem adapter:

- Connect the RS-232 9-pin D-sub port on your PC to the RS-232 9-pin D-sub rear panel port on the Master **FC-41** unit, as Figure 3 illustrates

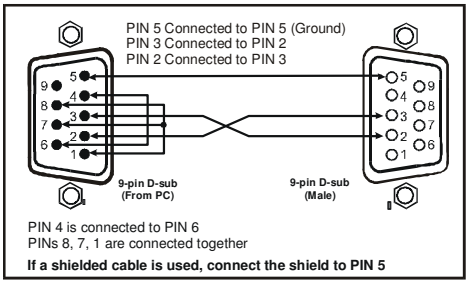

PIN 5 Connected to PIN 5 (Ground)
PIN 3 Connected to PIN 2
PIN 2 Connected to PIN 3
9-pin D-sub (From PC)
9-pin D-sub (Male)
PIN 4 is connected to PIN 6
PINs 8, 7, 1 are connected together
If a shielded cable is used, connect the shield to PIN 5

Figure 3: Connecting a PC without using a Null-modem Adapter

7 Using the FC-41 HD-SDI To Component Converter

This section describes how to:

- Lock/unlock the front panel button, see section 7.1
- Operate the **FC-41**, see section 7.2

7.1 Locking the Front Panel

To prevent changing the settings accidentally or tampering with the unit via the front panel buttons, lock[1] your converter. Unlocking releases the protection mechanism.

To lock the converter:

- Press the LOCK button for more than three seconds, until the LOCK button is illuminated
  The front panel is locked. Pressing a button will have no effect other than causing the LOCK button to blink[2]

To unlock the converter:

- Press the illuminated LOCK button for more than three seconds, until the LOCK button is no longer illuminated
  The front panel unlocks

7.2 Operating the FC-41 HD-SDI To Component Converter

The converter can save and load up to 16 setups via the converter menu. To use the menu, press the:

- MENU button to start or exit the menu
- ENTER button to enter a submenu, load a setup, accept changes and reset to the default settings
- ⬆ and ⬇ buttons to scroll through the menu and sub-menus
- ➡ and ⬅ to increase or decrease numerical values or select from several definitions of a setup

The converter automatically converts the input signal according to the setup loaded from the menu. The setup is defined via the menu. To operate the converter, press the MENU button to enter the menu, and load the desired setup (from 1 to 16). Table 2 defines the menu items.

1 Nevertheless, even though the front panel is locked you can still operate via RS-232

2 Warning that you need to unlock to regain control via the front panel

Table 2: The Converter Menu Items

#	Menu Item	Submenu	Select	Notes
1	LOAD …[1] SETUP		From 1 to 16	
2	SAVE SETTING AS		From 1 to 16	
3	SET … STANDARD SELECT MODE		AUTO, FORCED	
4	SET … STANDARD		720p/59, 720p/50, 1080i/60, 1080i/59, 1080i/50, 1080p/30, 1080p/29, 1080p/25, 1080p/24, 1080p/23, 1080sf/30, 1080sf/29, 1080sf/25, 1080sf/24, 1080sf/23	
5	SET … SYNC TYPE		BILEVEL, TRILEVEL	
6	SET … IMAGE TUNING (enter submenu)	1 FACTORY RESET		Sets all the image tuning parameters to zero
		2 BLACK	From -32 to 31	
		3 Y-GAIN	From -64% to 63%	
		4 GAIN	From -64% to 63%	
		5 COLOR	From -64% to 63%	
		6 B-Y	From -64% to 63%	
		7 R-Y	From -64% to 63%	
		8 SHARPNESS	From 0 to 155%	In 5% steps
7	SET … Test signal	NO TEST SIGNAL		
		1 COLOR BARS 100%		
		2 Y-SWEEP 30MHZ		
		3 PULSE 2T AND BAR		
		4 Y RAMP		
		5 C-SWEEP 15MHZ		
		6 SPLIT BARS		
		7 GRID		
		8 GRID INVERSE		
8	SET … Free run mode		BLACK SCREEN, BLUE SCREEN	
9	SET … Address of machine		First, Second	

1 … refers to the setup number (from 1 to 16)

8 Technical Specifications

Table 3 includes the technical specifications for the **FC-41**.

Table 3: Technical Specifications[1] of the FC-41 HD-SDI To Component Converter

INPUT:	1 SDI on a BNC connector
OUTPUTS:	2 SDI on BNC connectors 1 component video - Y, PB, PR, on 3 BNC connectors 1 RGB/HV on a 15-pin HD connector
MAX. OUTPUT LEVEL:	YUV: 1.2Vpp, XGA: 0.9Vpp
RESOLUTION:	Up to 1080p
S/N RATIO:	55dB
CONTROLS:	Front panel buttons: MENU, ENTER, menu arrows, LOCK; rear panel: RS-232
POWER SOURCE:	100-240V, 50/60Hz, 200mA Max. 12VA
DIMENSIONS:	19" (W), 7" (D), 1U (H) rack mountable
WEIGHT:	2.6kg (5.7lbs) approx.
ACCESSORIES:	Power cord

1 Specifications are subject to change without notice

9 Communication Protocol[1]

The **FC-41** is compatible with the protocol described below. For RS-232, a null-modem connection between the **FC-41** and controller is used. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit. All the values shown are hexadecimal.

Instruction	1st Byte	2nd Byte	3rd Byte	4th Byte	Notes:
RESET	00	80	80	98+Machine Addr	
REPLY TO RESET	40	80	80	98+Machine Addr	
READ LOCAL PARAMETER[2]	20	80+Parameter Number	80	B8+Machine Addr	
REPLY TO READ LOCAL PARAMETER[2]	60	80+Parameter Number	80+Parameter Data	B8+Machine Addr	
WRITE LOCAL PARAMETER[2]	21	80+Parameter Number	80+Parameter Data	B8+Machine Addr	
REPLY TO WRITE LOCAL PARAMETER[2]	61	80+Parameter Number	80+Parameter Data	B8+Machine Addr	1
READ GLOBAL PARAMETER[3]	20	80+Parameter Number	80	98+Machine Addr	
REPLY TO READ GLOBAL PARAMETER[3]	60	80+Parameter Number	80+Parameter Data	98+Machine Addr	
WRITE GLOBAL PARAMETER[3]	21	80+Parameter Number	80+Parameter Data	98+Machine Addr	
REPLY TO WRITE GLOBAL PARAMETER[3]	61	80+Parameter Number	80+Parameter Data	98+Machine Addr	1
SAVE	23	80 + Initial Setup Number	80+Destination Setup Number	98+Machine Addr	2
IDENTIFY MACHINE	3D	81	80	98+Machine Addr	3
IDENTIFY FIRMWARE VERS.	3D	83	80	98+Machine Addr	4

1 Version 1.2

2 See Table 4

3 See Table 5

Table 4 defines the local parameter data:

Table 4: Local Parameter Data

Local Parameter Number		Local Parameter Data
Description	**#**	
Input Standard	01	0 - 720p/60
		1 - 720p/59
		2 - 720p/50
		3 - 1080i/60
		4 - 1080i/59
		5 - 1080i/50
		6 - 1080p/30
		7 - 1080p/29
		8 - 1080p/25
		9 - 1080p/24
		A - 1080p/23
		B - 1080sf/30
		C - 1080sf/29
		D - 1080sf/25
		E - 1080sf/24
		F - 1080sf/23
Mode Input Standard	02	0 - Auto
		1 - Forced
SYNC Type	04	0 - Bi-Level
		1 - Tri-Level
Test Signal	05	0 - NO TEST SIGNAL
		1 - COLOR BAR 100%
		2 - Y-SWEEP 30 MHZ
		3 - PULSE 2T AND BAR
		4 - Y-RAMP
		5 - C-SWEEP 15 MHZ
		6 - RAINBOW
		7 - GRID
		8 - GRID INVERS
Black	08	-32% - +31% (1% step)
Y-gain	09	-64% - +63% (1% step)
Gain	0A	-64% - +63% (1% step)
Color	0B	-64% - +63% (1% step)
B-Y	0C	-64% - +63% (1% step)
R-Y	0D	-64% - +63% (1% step)
Sharpness	0E	0% - +150% (10% step)

Table 5 defines the global parameter data:

Table 5: Global Parameter Data

Global Parameter Number		Global Parameter Data
Description	**#**	
Panel Lock	00	0 - Off (Default)
		1 - On
Machine Address	01	0,1
Setup Number	02	0 - 15
Free Run Mode	03	0 - Black Screen (Default)
		1 - Blue Screen
Input Standard (Read Only) (AUTO Mode Only)	08	0 - 720p/60
		1 - 720p/59
		2 - 720p/50
		3 - 1080i/60
		4 - 1080i/59
		5 - 1080i/50
		6 - 1080p/30
		7 - 1080p/29
		8 - 1080p/25
		9 - 1080p/24
		A - 1080p/23
		B - 1080sf/30
		C - 1080sf/29
		D - 1080sf/25
		E - 1080sf/24
		F -1080sf/23
		10 - Not Identified
		11 - Not Identified
Presence of Input Signal (Read Only)	09	0 - Input Signal is Present
		1 - No Input Signal

NOTE 1: These commands are sent by the unit also when Local / Global parameters are changed via the front panel or as a result of execution of any other command.

NOTE 2: If it is necessary merely to save adjusted parameters in initial setup number (no setup number change), then the value of byte3 must be equal to the value of byte2 - initial setup number.

NOTE 3: The reply to the Identify Machine command shows the machine name
- 1st byte: 0x7d
- 2nd byte: 0x80 + 0x00 (0 dec)
- 3rd byte: 0x80 + 0x29 (41 dec) - for the unit FC-41
- 4th byte: 0x98

NOTE 4: The reply to the Identify Firmware command shows the firmware version as
- 1st byte: 0x7d
- 2nd byte: 0x80 + the version number prior to decimal point
- 3rd byte: 0x80 + the version number following the decimal point
- 4th byte: 0x98

For example, for version 3.5, the reply would be 0x7d, 0x83, 0x85, 0x98.

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC* Rules and Regulations: Part 15: "Radio frequency devices Subpart B Unintentional radiators"

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

* FCC and CE approved using STP cable (for twisted pair products)

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found.
We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

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P/N: 2900-000328 REV 2